

Special features

A A framework for analysing and assessing cross-border spillovers from macroprudential policies⁹²

Macroprudential measures implemented in individual Member States may have cross-border or cross-sectoral repercussions. This special feature discusses cross-border spillover channels. To limit negative spillover effects, macroprudential instruments should be applied consistently across countries, and reciprocity agreements must be applied transparently.

Introduction

Macroprudential policy measures within the EU are generally designed to address specific, systemic, financial stability risks in individual Member States, including those stemming from specific sectors or even individual financial institutions.⁹³ They should enhance financial stability in the long term, as lowering the probability of a systemic crisis in one EU (or euro area) Member State means there is less risk of contagion in the others. However, macroprudential policy may generate unintended negative cross-border or cross-sectoral spillovers in the short term, owing to regulatory arbitrage by financial institutions. Policy instruments should therefore be designed to reap the benefits of positive spillovers in terms of increased financial stability, while also seeking to contain potential negative spillovers.

Conceptual issues of macroprudential spillovers

In order to analyse the cross-border effects of macroprudential measures, three main aspects of spillovers need to be considered.

The first is the direction of cross-border spillovers: do spillovers from macroprudential measures mainly affect conditions abroad or are foreign financial institutions able to circumvent national macroprudential policy, i.e. are they inward or outward spillovers?

Outward spillover means that other countries are affected by a macroprudential policy action carried out by an individual Member State. These spillovers may then require the affected country, or countries, to adopt their own macroprudential policies to counter these effects. Coordination between countries is thus important, and

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⁹³ ECB staff, in particular in the context of the ESRB's expert group on cross-border spillovers and reciprocity, are working on developing a framework for analysing spillovers from macroprudential policies and are gathering data-based evidence on the relative importance of various identified transmission channels. The expert group intends to build on these findings to develop recommendations on reciprocity for macroprudential policies.

reciprocity arrangements may be called for in instances where these spillovers have a material knock-on effect.

On the other hand, inward, or “waterbed”, spillovers occur where foreign financial institutions circumvent macroprudential policy that does not apply to them by exploiting arbitrage opportunities. One such example is where branches of foreign banks increase lending as a result of tighter credit standards or capital requirements imposed on domestic banks, since branches – in the absence of reciprocity arrangements – are not bound by domestic macroprudential policy measures. This leads to “leakages” of macroprudential policy.

In the United Kingdom, Aiyar, Calomiris and Wieladek⁹⁴ find evidence that macroprudential regulation does leak across UK financial sub-sectors and unregulated institutions take up the business from the regulated institutions. Ongena, Popov and Udell⁹⁵ further find for eastern Europe that regulatory conditions in the country of the parent institution also influence the risk-taking behaviour of the parts abroad, thereby indicating spillover effects.

A second aspect of spillovers is that they can have positive or negative effects on systemic risk in the affected country. Whether the spillovers are beneficial or detrimental may depend on the relative position of financial cycles across countries. During a credit boom, a tightening macroprudential policy can generate outward spillovers which may pose additional financial stability risks to the foreign country if it is also in a boom phase. Conversely, the same outward spillovers would stabilise the financial system if the foreign country is experiencing a phase of excessive deleveraging. The degree of synchronisation of financial cycles across countries is therefore of relevance when assessing spillovers.

Third, the magnitude and reach of spillovers also depends on whether macroprudential instruments are applied at the solo, sub-consolidated or consolidated balance sheet level, as well as on what exposures they cover. The incentives for banks to adjust their asset portfolios or their funding composition vary significantly based on this, especially for large cross-border banks. Similarly, incentives for conducting cross-border arbitrage may differ, depending on whether measures are applied only to domestic exposures or to all exposures.

If an exposure-based measure is applied at the solo level, it is typically applicable in a geographically confined area to which the affected individual institutions are exposed. The main aim of such a measure may therefore not only be to improve the banking sector’s resilience, but also to counter excessive risk-taking or lending by financial institutions in a geographically confined area. Conversely, if capital buffers are applied at the consolidated level, i.e. at group level, the measures also affect the activities of groups’ branches and subsidiaries located in foreign countries, which, in turn, influences the credit supply in those countries. The main rationale behind these

⁹⁴ Aiyar, S., Calomiris, C.W. and Wieladek, T., “Does Macroprudential Regulation Leak? Evidence from a UK Policy Experiment”, *Journal of Money, Credit and Banking*, 46 (1), 2014.

⁹⁵ Ongena, S., Popov, A. and Udell, G.F., “When the Cat’s Away the Mice Will Play: Does Regulation At Home Affect Bank Risk Taking Abroad?”, *Journal of Financial Economics*, 108(3), 2013, pp. 727-750.

additional buffers at consolidated level may thus be to strengthen the resilience of the banking groups, irrespective of the impact on lending and economic activity. At the same time, such a measure applied at consolidated level may lead to outward spillovers and its specific effects in different countries will depend on the internal decision of the banking groups on how to allocate capital and liquidity buffers across their substructures.

With these conceptual categories in mind, the following section describes the main transmission channels of macroprudential instruments.

Spillover channels

There are several channels of propagation through which macroprudential policy action can have cross-border effects. Some propagation channels may be particularly relevant for one macroprudential instrument, but negligible for another. Yet other channels may exist theoretically, but have little quantitative impact in practice. This section identifies the possible channels of propagation and classifies them in terms of the main ways they operate, namely: (i) cross-border adjustment of lenders' risk exposures; (ii) a change in networks and the associated potential for contagion; (iii) regulatory arbitrage; (iv) a change in the functioning of the monetary transmission mechanism; and/or (v) trade effects (see Table A.1).

Table A.1
Channels of cross-border spillover from macroprudential policy

Channel	Transmission	Description
1. Cross-border risk adjustments	A. Adjustments of cross-border credit exposures	Macroprudential policy affects banks' cross-border portfolio allocation in that banks change their holdings of foreign credit exposures, be they in the form of cross-border direct lending or securities exposures or through subsidiaries or branches active in the other country.
	B. Adjustments of cross-border securitisation activity	Macroprudential policy may alter banks' incentives to transfer credit risk to another country, for instance by encouraging/discouraging the originate-to-distribute business model, which may also rely on international funding sources.
	C. Access to cross-border capital markets	Access to capital markets and the related ability/willingness to raise funds may be an important facilitating/mitigating factor for deleveraging, which affects the second-round effects of shocks.
2. Network formation and potential for contagion	D. Adjustments of cross-border liquidity/funding lines	Macroprudential policy may affect banks' instrument mix on the liability side, in particular in terms of reliance on cross-border funding, e.g. subordinated loans and liquidity (interbank and repo markets). This, in turn, affects the network structure of the system, which is an important factor determining contagion.
	E. Adjustment of asset prices	Macroprudential policies may change the demand for certain financial assets and thus their prices. Asset prices, in turn, may affect banks' portfolio choices: overvaluation can invite pro-cyclical risk-taking, while extreme downward price adjustments can lead to portfolio rebalancing and spur fire sales.
	F. Common exposures	Macroprudential policies, in particular the introduction of large exposure limits, can make banks' portfolio composition more granular, thereby reducing common exposures to certain sectors within the system, for instance to sovereign risk. This in turn increases the system's resilience to sectoral shocks and decreases the potential for cross-border contagion as a result.
3. Regulatory arbitrage	G. Capital regulatory arbitrage	Increasing capital requirements may alter incentives for circumventing the regulatory restrictions by actively shifting capital within the group, by shedding capital-intensive activity off the balance sheet to special purpose vehicles, or by opening (or converting subsidiaries into) branches in jurisdictions where capital requirements are higher.
	H. Liquidity regulatory arbitrage	Liquidity restrictions could lead to liquid assets being moved abroad, mostly in the form of intragroup transfers, without, however, changing the liquidity position of the entire banking group.
	I. Shadow banking activity	Stricter regulation of banks could also lead to "waterbed effects" by paving the way for credit growth in a non-regulated (shadow) banking sector. As the shadow banking system operates more strongly internationally, liquidity conditions can easily be transmitted across borders. On the other hand, macroprudential instruments targeting financial markets and non-bank financial institutions can help prevent such leakages and ensure consistency in regulation across sectors.
4. Altering monetary transmission	J. Relative cost of lending	Macroprudential policy can affect the relative cost of lending in a cross-border context. This may reinforce or weaken the monetary policy transmission depending on whether monetary and macroprudential policy work in tandem or in opposite directions. Macroprudential policy may provide a more targeted instrument to account for different cross-country positions in the financial cycle.
	K. Changing term structure	Amending bank liquidity and funding requirements or restricting investment funds' liquidity mismatch may affect the term structure of the yield curve. In a cross-border context, this may lead to a different level of propagation of monetary policy across countries owing to the relative importance of demand for and supply of longer-term assets, as well as through differing expectations about their timing.
5. Trade effects	J. Foreign trade	By influencing credit, macroprudential policy may affect economic activity, which in turn could lead to changes in foreign trade activity by altering exports and imports.
	K. Relative prices of tradable and non-tradable goods	Housing cannot be traded across borders. However, macroprudential policy can change the relative prices of certain tradable and non-tradable goods and in this way affect foreign trade patterns.

In practice, not all channels are equally important in determining the level of cross-border spillover of macroprudential policy. The channels that operate by altering incentives for financial institutions to adjust either the asset or liability side of their balance sheets (see channels 1 to 3 in Table A.1) are likely to be more pronounced than indirect channels that alter monetary policy transmission or relative goods prices (see channels 4 and 5 in Table A.1).

Table A.2

Cross-border spillover channels and their potential importance by macroprudential policy instrument

Degree of importance of the channels for spillovers

	Potentially strong transmission
	Potentially medium-strong transmission
	Potentially weak-medium transmission
	Transmission channel considered to be weak or absent

			Risk adjustment				Network and contagion		Regulatory arbitrage			Monetary policy
			Cross-border loan origination outward spillover	Cross-border loan origination inward spillover	Securitisation activity (cross-border risk shifting)	Capital strengthening (raise capital in international markets)	Cross-border portfolio exposures (assets, liabilities)	Cross-border asset price effects (portfolio rebal., wealth effects)	Intragroup capital management	Intragroup liquidity management	Shift in activity from affected to unaffected bank/non-banks	Altering relative cross-border cost of lending
Capital instruments	Global systemically important institution buffer (G-SII)/ Other systemically important institution buffer (O-SII)	consolidated level										
	Systemic risk buffer/ Other systemically important institution buffer (O-SII)	consolidated level										
		sub-consolidated/ solo level (exposure-based)										
	Counter-cyclical buffers	consolidated level										
	Leverage ratio	consolidated level										
Sectoral choice	Sector-specific capital buffers, large exposure restrictions	exposure-based										
	Risk weights Loss given defaults	exposure-based										
	Loan-to-value, loan-to-income, debt-to-income, debt-servicing-to-income (on new loans)	exposure-based										
Liquidity positions	Liquidity coverage ratio, liquidity charges	consolidated level										
	Net stable funding ratio	consolidated level										
	Loan-to-deposit	consolidated level										
		solo level										

Note: The importance of channels was decided based on expert judgement.

Moreover, the relative importance of the different channels also depends on the specific macroprudential instrument activated. In general, domestic considerations are likely to be the main factor in determining whether a macroprudential instrument is activated. In addition, cross-border effects occurring through different channels may be of relevance when choosing a specific measure (see [Table A.2](#)). Capital and sector-specific measures have potentially important effects on banks' cross-border lending to the real economy (cross-border corporate and household lending) as they lead to a change in lending incentives, causing banks to readjust their outstanding loan portfolios. The adjustment need not be done exclusively through a change in quantities, but may also involve a change in relative cross-border lending costs. Measures that are applied to specific bank exposures or even borrowers, such as caps on loan-to-value or debt-service-to-income ratios, are less prone to negative spillovers, as the possibility for arbitrage is limited.⁹⁶ Yet, they may still induce portfolio adjustments, as these measures affect the demand for loans and the riskiness of the exposure and, therefore, the relative risk-adjusted price of credit risk between the portfolios affected and unaffected by the measures. By contrast, liquidity-based measures tend to have stronger effects on interbank relationships (interbank lending). Overall, all types of measure could have an impact on the non-bank sector, but there is a particularly strong potential for spillover when it comes to liquidity-based measures.

Potential for spillovers

Potentially the most important channels of propagation are the risk adjustment channel, the network formation channel and the arbitrage channel. Implied spillover risks depend on the structure of financial institutions and their cross-border exposures. A range of datasets are available, covering either locational or consolidated data, which may be used to gauge different aspects of the cross-border phenomenon.⁹⁷

As regards the risk adjustment channel, locational statistics indicate that countries whose banking sectors are reliant on sizeable deposit funding relative to the size of the economy, such as Luxembourg, Cyprus, Ireland, Malta and Finland, are large cross-border net lenders to other countries (see [Chart A.1](#)). These countries' banking sectors are thereby potentially more vulnerable to external shocks to their asset portfolios, but outward spillovers to other countries may also result when macroprudential instruments are applied to those banking sectors.

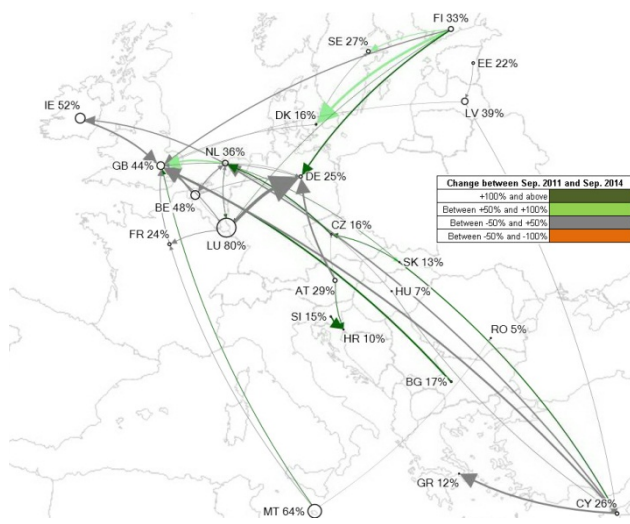
⁹⁶ Indeed, recent research suggests that exposure-based measures, such as caps on loan-to-value and debt-to-income ratios, could be more efficient as macroprudential tools than capital-based measures (see [Żochowski, D., "Macroprudential policy in a monetary union", ECB, forthcoming](#)).

⁹⁷ Locational data, developed for monetary policy purposes, can be used to assess the extent of direct cross-border lending and borrowing, while consolidated data can be used to measure cross-border exposures, including via branches and subsidiaries.

Chart A.1

Banking sectors with excess deposit funding are large cross-border net lenders

Non-MFI cross-border loans as a share of total bank assets in the lending country

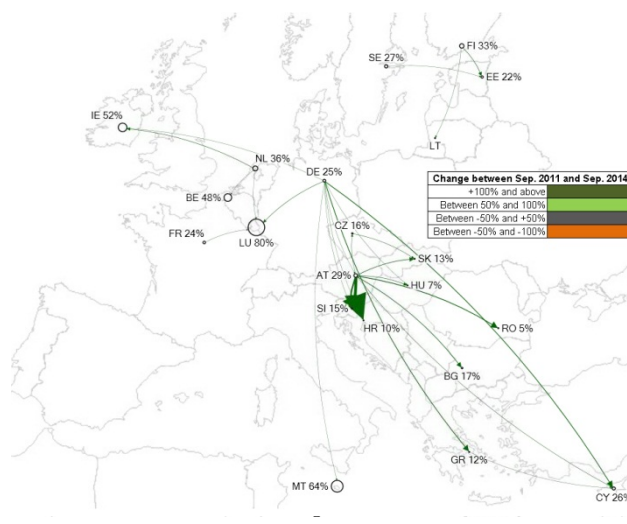


Source: ECB MFI statistics (balance sheet items).
Notes: The arrows represent values from September 2014 and the colour of each arrow represents the percentage change since September 2011. The percentage next to the country node denotes each country's share of foreign loans in total loans (node size adjusted proportionally).

Chart A.2

Cross-border lending in south-eastern Europe is largely funded by Austrian banks

Non-MFI cross-border loans as a share of total bank assets in the borrowing country



Source: ECB MFI statistics (balance sheet items).
Notes: The arrows represent values from September 2014 and the colour of each arrow represents the percentage change since September 2011. The percentage next to the country node denotes each country's share of foreign loans in total loans (node size adjusted proportionally).

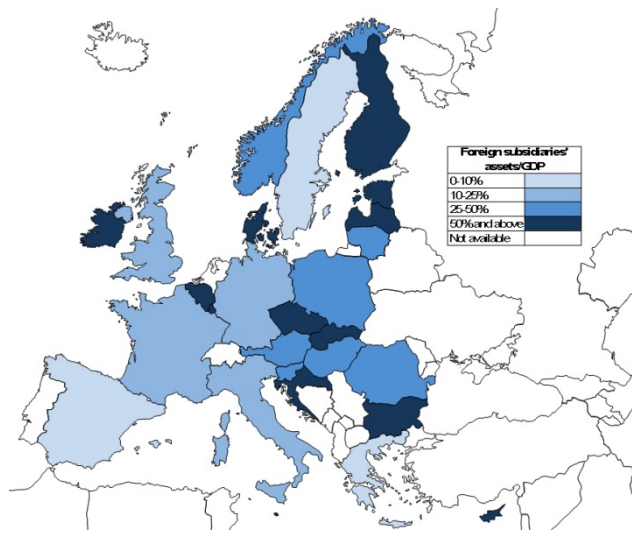
While a perspective from the lender's side indicates possible financial hubs, a perspective from the borrower's side may reveal vulnerabilities linked to the borrower's reliance on banks in specific other countries. If macroprudential measures are changed in the lending country, the borrower country may be strongly affected. The locational data indicate that lending to the real sector in south-eastern Europe stems to a large degree from Austria (see Chart A.2). The Austrian banking sector is thereby an important provider of cross-border loans and may either easily provide additional lending when south-eastern European countries tighten macroprudential policies through inward spillovers or be strongly affected by macroprudential measures applied to Austrian banks. For a full assessment, the legal structure (e.g. branches or subsidiaries) of the banking sector needs to be fully mapped.

While available data sources for locational statistics provide detailed information on the cross-border aspects of lending flows and cross-border exposures, they do not distinguish between the real sector and non-bank financial institutions (such as investment funds or insurance companies). Furthermore, they do not distinguish between the activities of foreign subsidiaries of banking groups and those of their branches. The importance of the risk adjustment channel, however, may be linked to large banking groups that adjust their activity across borders by optimising the consolidated balance sheet to the changing regulatory conditions through their subsidiaries and branches. As indicated, the distinction between branches and subsidiaries is relevant as only branches are subject to the regulatory conditions of their host country.

Chart A.3

Foreign subsidiaries exhibit the greatest amount of activity in the smaller EU countries

Foreign subsidiaries' total assets as a percentage of GDP

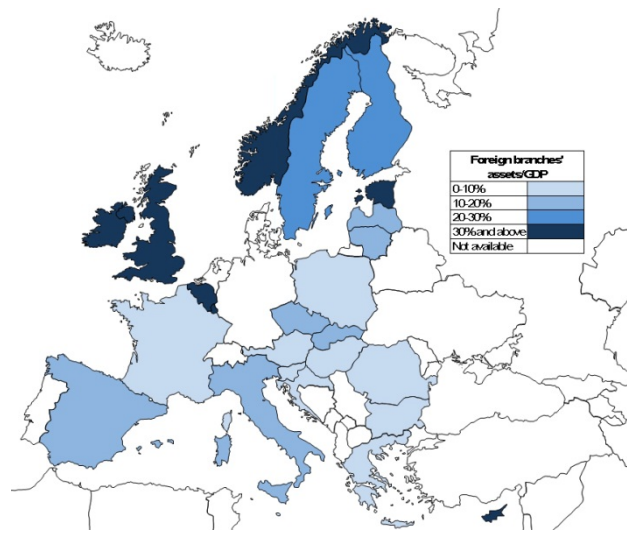


Source: EBA.
Note: Based on 2013 transparency exercise with EEA counterparties.

Chart A.4

Foreign branches exhibit the greatest amount of activity in northern European countries

Foreign branches' total assets as a percentage of GDP



Source: EBA.
Note: Based on 2013 transparency exercise with EEA counterparties.

Comparing the relative importance of subsidiaries or branches across EU countries reveals that banking activity by foreign banks is predominantly conducted via subsidiaries. The ratio of foreign subsidiaries' assets to GDP is largest in Ireland, Belgium, Luxembourg, Denmark, Finland, Estonia, Latvia, the Czech Republic, Slovakia, Croatia, Bulgaria and Cyprus, where it exceeds 50% (see Chart A.3). The same ratio for branches reveals that assets in foreign branches exceed 30% of GDP in Ireland, the United Kingdom, Belgium, Estonia and Cyprus (see Chart A.4). A large share of branches could imply spillovers through adjustments to the relative macroprudential stance of the home and host country. Branches are subject to the macroprudential policy in the home country of the bank and are therefore prone to divert lending towards the host country if macroprudential policy is tighter in the home country. Although subsidiaries are subject to the regulatory conditions in the host country, a large share of subsidiaries in one country can indicate substantial potential for regulatory arbitrage through two main channels. Inward spillovers would result from circumvention of the macroprudential measures when financial intermediation that previously took place via subsidiaries is shifted to branches or if subsidiaries are converted into branches. In addition, these spillovers may occur if lending in the country is substituted with direct lending from the home country of the banking group. In either case, the financial intermediation would no longer fall within the realm of macroprudential policy in the host country. Nevertheless, in some countries the high share of branches is explained by their function as intermediary for international financial transactions with limited relevance for domestic activity, but data limitations make these distinctions difficult at the current stage.

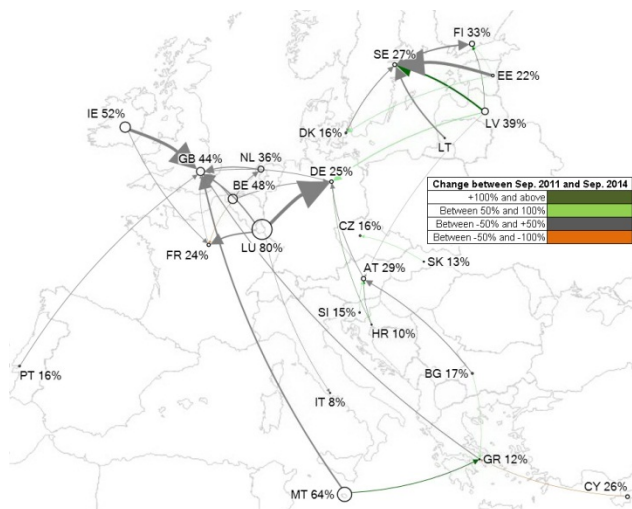
In addition to the impact that cross-border lending to the real economy and branch activity have on financial stability, cross-border interbank activity also paves the way for the formation of networks that facilitate contagion between financial institutions in

times of systemic stress. More gradual, yet still sizeable, adjustments may take place when macroprudential policy is changed, especially in the case of liquidity measures, as these encourage banks to adjust liquidity positions across entities.

Chart A.5

Local interbank hubs emerge...

Interbank cross-border loans as a percentage of cross-border interbank lending

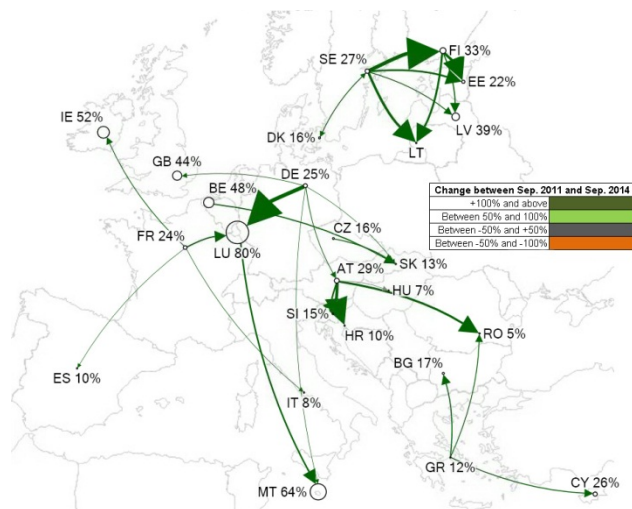


Source: ECB MFI statistics (balance sheet items).
Notes: The arrows represent values from September 2014 and the colour of each arrow represents the percentage change from the respective values in September 2011. The percentage denotes each country's share of foreign loans in total loans. The node size is proportional to this percentage. The reference period is September 2014

Chart A.6

... which are possibly involved in maturity transformation

Interbank cross-border loans as a percentage of borrowers' total assets



Source: ECB MFI statistics (balance sheet items).
Notes: The arrows represent values from September 2014, and the colour of each arrow represents the percentage change from the respective values in September 2011. The percentage denotes each country's share of foreign loans in total loans. The node size is proportional to this percentage. The reference period is September 2014

Locational data identifies the United Kingdom as an important interbank hub: in many European countries, cross-border interbank lending is dominated by lending to banks located in the United Kingdom.⁹⁸ In addition to the United Kingdom, Sweden, Austria and Greece also appear to act as local hubs (see Chart A.5). These hubs are not only important in terms of the share of interbank lending of which they are the recipients, but are also relevant in terms of the liquidity they provide to the banking sectors in neighbouring countries (see Chart A.6). For example, a large share of interbank loans from neighbouring countries is directed to Sweden and Austria, and these two countries, in turn, provide a sizeable volume of funding back to banks in their neighbouring countries. If equity participation structures between banks in “hub countries” are also considered, this leads to the conclusion that “hub countries” are involved in maturity transformation, e.g. subsidiaries provide short-term loans to the parent company, while the parent provides more stable long-term funding to its subsidiaries.

In addition to cross-border lending to the real economy and branch activities, the risk adjustment channel can also come into effect via banks' exposures to foreign

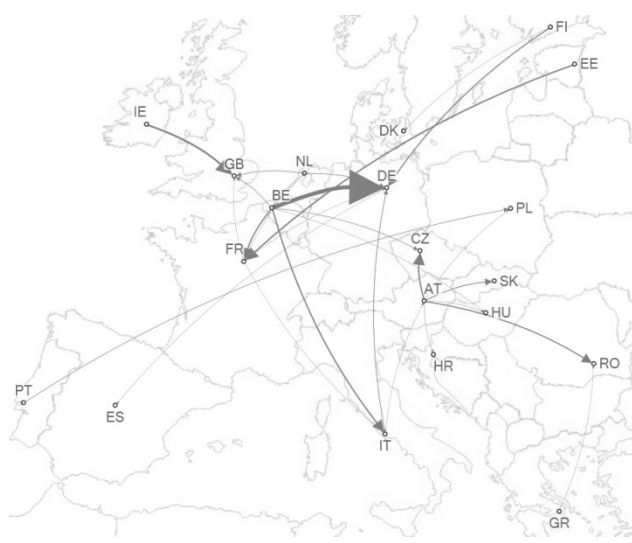
⁹⁸ The predominance of the United Kingdom is partly due to intragroup activity, as many European banks have subsidiaries located in London that specialise in international banking services, and these subsidiaries need funding from the parent companies to provide these services.

sovereign risk. Such linkages played a very prominent role in the spread of the recent sovereign debt crisis, for example. Locational data indicate that, in addition to some idiosyncratic links, Belgian banks hold large amounts of German government bonds, Irish banks hold a significant amount of UK debt, while Austrian banks tend to keep sovereign bonds of neighbouring countries (see Chart A.7).

Chart A.7

The post-crisis cross-border bank/sovereign nexus has weakened

Sovereign bond holdings as a share of total bank assets

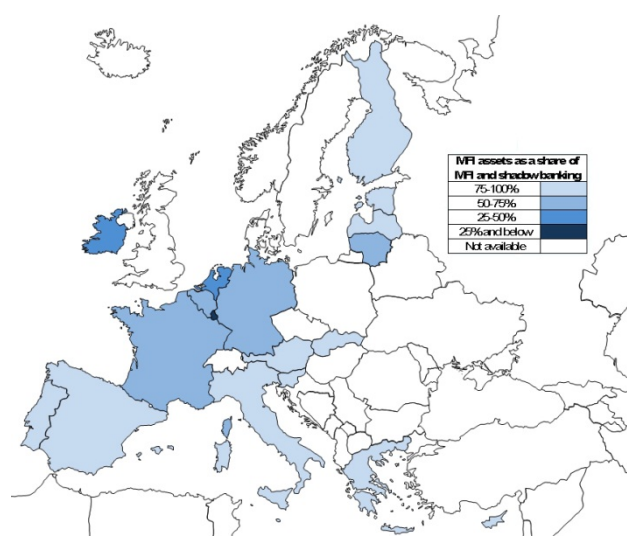


Source: 2014 comprehensive assessment database.
Notes: The arrows represent sovereign holdings as a share of the lending country's total assets. The reference period is the end of 2013.

Chart A.8

Shadow banks pose challenges for the efficient conduct of macroprudential policy

Share of banking sector assets in total financial sector assets



Sources: EBA, ECB.
Notes: The arrows represent values from the end of 2013. Shadow banking assets here include not only assets of euro area financial vehicle corporations, money market funds and non-money market investment funds, but also assets of insurance corporations and pension funds. The reference period is the first quarter of 2014.

The potential for cross-sectoral leakage of macroprudential policy measures can be assessed by the ability of other sectors to take over banking sector activities. This can be measured by the relative size of the non-MFI financial sector, including the shadow banking sector, which is largest in Luxembourg, the Netherlands and Ireland (see Chart A.8). The relative importance of the shadow banking sector in these countries is partly due to tax incentives, which means that there tends to be a greater emphasis on international rather than domestic financial intermediation. Furthermore, while the assets of the non-bank financial institutions are concentrated in these three countries, the activities of the shadow banking sector, in particular, are only marginally constrained by borders. The global and implicitly pan-European reach of this sector poses challenges for the efficient conduct of macroprudential policy, which has been focused on banking so far, precisely because of leakages or waterbed effects.

Concluding remarks

Macroprudential policies are intended to increase the resilience of financial market participants and to smooth financial cycles. In a financially integrated monetary

union, there is a large potential for these macroprudential policies to spill over across borders. Moreover, it can be difficult to assess these spillovers, not only because their magnitude depends on the type of instrument used, the level of synchronisation of the financial cycles and the level of consolidation, but also because data may be incomplete, especially for historical developments. With the ECB's new macroprudential powers, cross-border analysis is highly relevant for assessing the impact of specific instruments, particularly if a consistent macroprudential approach is to be ensured within the Single Supervisory Mechanism (SSM). The ECB therefore monitors the extent of cross-border exposures, the changing network links and the adjustments made in response to macroprudential policies that have been implemented. When using existing datasets, the ECB also identifies data gaps and seeks to close these over time through data collection initiatives. Here, the availability of supervisory data collected by the SSM is an important step towards achieving a harmonised reporting standard. This should also facilitate the analysis of regulatory capital and liquidity arbitrage.

The ECB, as a supervisor for SSM countries, is in an ideal position to develop expertise on data issues. In parallel, the ESRB and its expert group on cross-border spillovers and reciprocity are developing recommendations for a lenient and transparent reciprocity framework.

To ultimately counter spillovers, macroprudential instruments need to be applied consistently across countries and reciprocity agreements must be applied transparently. So far, only one reciprocity arrangement has been implemented on a voluntary basis, partly due to the fact that a number of activated macroprudential instruments relate to capital surcharges for systemically important banks and are entity-based, and therefore do not require reciprocity. Going forward, as different and more exposure-based measures are taken, more countries will need to follow the example of the Dutch authorities, who have reciprocated a measure taken by the Nationale Bank van België/Banque Nationale de Belgique, if a level playing field is to be achieved in the Single Market (see Section 3.3).